AMENDMENTS
TO
THE WATER QUALITY CONTROL PLAN FOR THE SACRAMENTO RIVER AND SAN JOAQUIN RIVER BASINS

FOR

THE CONTROL OF ORCHARD PESTICIDE RUNOFF AND DIAZINON RUNOFF INTO THE SACRAMENTO AND FEATHER RIVERS

FINAL STAFF REPORT

APPENDIX F

DETAILED COST ANALYSIS FOR PEST MANAGEMENT AND RUNOFF MITIGATION ALTERNATIVES FOR ALMONDS, PEACHES, AND DRIED PLUMS

Appendix F
Detailed Cost Analysis for Pest Management and Runoff Mitigation Alternatives

Table F.1. (Table 8.5 in main report) Detailed cost analysis for base case and alternate scenarios for almonds. Costs are per acre. Vegetated cover is provided by a planted cover crop.

	Base case: dormant oil + diazinon	Low risk to water quality[1]			Mix: high & low risk to water quality	High risk to water quality
Cost Category		Dormant oil only	Dormant oil[2] + Bt at bloom	Dormant oil + spinosad	SEE FOOT-NOTE 5	
Pest Management [a]						
Cost per Application (based on 100 acres)	$20	$20	$20	$20		$20
Dormant Pesticides						
Supreme Oil (4 gal/acre)	$12	$12	$12	$12		$12
Success (6 oz/ac)				$30		
Diazinon 50 (3.5 lb/acre)	$19					
Asana XL (4-6 oz/ac)[3]						$5
Dipel (1 lb/ac) [2]			$28			
In-season Pesticides						
Trilogy 90EC (2g/acre) [2]		$140	$140	$140		
Omite 30 WP (7.5 lb/acre)						$45
Probability of Needing In-season Applications[b]	0.35	0.20	0.20	0.40		0.35
Cover Crop[c]		$50	$50	$50		$50
Other Cultural Costs	$928	$928	$928	$928	$928	$928
Total Cultural Costs	$993	$1,046	$1,114	$1,112	$1,100	$1,038
Other Costs[d]						
Harvest Costs per acre	$330	$330	$330	$330	$330	$330
Advisory Board Assessment	$-	$-	$-	$-	$-	$-
Interest on Operating Capital	$37	$39	$41	$41	$40	$38
Cash Overhead	$134	$134	$134	$134	$134	$134
Annualized Planting Costs	$43	$43	$43	$43	$43	$43
Total Costs	$1,537	$1,592	$1,662	$1,660	$1,647	$1,583
Gross Revenue[4]	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000
Returns to Land, Mgt & Overhead	$463	$408	$338	$340	$353	$417
Total Costs as Percent of Gross Revenue	77%	80%	83%	83%	82%	79%
Change in Cost from Base Case	$-	$55	$125	$123	$110	$46
% Change in Cost from Base Case	0%	4%	8%	8%	7%	3%

1) Feasibility of this option may depend on pest pressure; 2) Two applications required--cost is for two applications; 3) Choice of this pesticide will also probably require use of miticide such as Vendex, Apollo, Omite, Kelthane, Agri-Mek; 4) Yield for almonds: 1 ton per acre Price per ton: $2000 Data are for 2001; Yield for peaches: 22 tons per acre Price per ton: $210 Data are for 1998, a cost inflation rate of 3% was used to adjust costs to 2001: Yield for dried plums: 4 tons per acre Price per ton: $800 Data are for 2001. 5) The costs for the "Mix" of low risk and high risk scenarios assumes 20% of the growers use the Base Case with a cover crop and 80% of the growers use dormant oil with Bt at bloom.

a) Costs are from Zalom, et al., 1999; b) Estimated probability is based on CDPR Pesticide Use Report data, 1998-2001

c) Costs are from Thomas, F. CERUS Consulting. Personal Communication; d) Costs for typical practices are from University of California Cooperative Extension (UCCE 2001a,b; 1998)

"**Other Cultural Costs--Non Pest Management**" includes annual cost per acre for typical cultural practices such as winter sanitation, pruning, brush disposal, pollination, irrigation, fertilization, leaf analysis, vertebrate pest, weed, and disease control, vehicle use, and consultant fees. "**Harvest Costs**" include shaking, raking, sweeping, pickup and haul, hull and shell, bin distribution, hand picking, and field sorting, depending on the crop type. "**Advisory Board Assessment**" is a mandatory fee assessed on each ton harvested "**Interest on Operating Capital**" is based on cash operating costs and is calculated monthly until harvest at a nominal rate of 10.51% per year. "**Cash Overhead**" is expenses assigned to the whole farm, including property taxes, interest on operating capital, office expense, insurance, sanitation services, and equipment repairs. "**Annualized Planting Costs**" includes land preparation, tree cost, planting, and staking, divided by orchard lifespan (almonds and peaches 25 years; plums 30 years)

Appendix F
Detailed Cost Analysis for Pest Management and Runoff Mitigation Alternatives

Table F.2. Cost analysis for base case and alternate scenarios for peaches. Costs are per acre. Vegetated cover is provided by a planted cover crop.

	Base case: dormant oil + diazinon	Low risk to water quality[1]			Mix: high & low risk to water quality	High risk to water quality
Cost Category		Dormant oil only	Dormant oil[2] + Bt at bloom	Dormant oil + spinosad	SEE FOOT-NOTE 5	
Pest Management [a]						
Cost per Application (based on 100 acres)	$20	$20	$20	$20		$20
Dormant Pesticides						
Supreme Oil (4 gal/acre)	$12	$12	$12	$12		$12
Success (6 oz/ac)				$30		
Diazinon 50 (3.5 lb/acre)	$19					
Asana XL (4-6 oz/ac)[3]						$5
Dipel (1 lb/ac) [2]			$28			
In-season Pesticides						
Trilogy 90EC (2g/acre) [2]		$140	$140	$140		
Omite 30 WP (7.5 lb/acre)						$45
Probability of Needing In-season Applications[b]	0.1	0.1	0.2	0.7		0.25
Cover Crop[c]		$50	$50	$50	$50	$50
Other Cultural Costs	$1,415	$1,415	$1,415	$1,415	$1,415	$1,415
Total Cultural Costs	$1,470	$1,515	$1,601	$1,653	$1,536	$1,518
Other Costs[d]						
Harvest Costs per acre	$975	$975	$975	$975	$975	$975
Advisory Board Assessment	$42	$43	$43	$43	$43	$43
Interest on Operating Capital	$70	$71	$74	$75	$72	$71
Cash Overhead	$248	$248	$248	$248	$248	$248
Annualized Planting Costs	$75	$75	$75	$75	$75	$75
Total Costs	$2,880	$2,927	$3,016	$3,069	$2,949	$2,931
Gross Revenue[4]	$4,620	$4,620	$4,620	$4,620	$4,620	$4,620
Returns to Land, Mgt & Overhead	$1,740	$1,693	$1,604	$1,551	$1,671	$1,689
Total Costs as Percent of Gross Revenue	62%	63%	65%	66%	64%	63%
Change in Cost from Base Case	$-	$47	$136	$189	$69	$51
% Change in Cost from Base Case	0%	1%	3%	4%	1%	1%

1) Feasibility of this option may depend on pest pressure; 2) Two applications required--cost is for two applications; 3) Choice of this pesticide will also probably require use of miticide such as Vendex, Apollo, Omite, Kelthane, Agri-Mek; 4) Yield for almonds: 1 ton per acre Price per ton: $2000 Data are for 2001; Yield for peaches: 22 tons per acre Price per ton: $210 Data are for 1998, a cost inflation rate of 3% was used to adjust costs to 2001: Yield for dried plums: 4 tons per acre Price per ton: $800 Data are for 2001. 5) The costs for the "Mix" of low risk and high risk scenarios assumes 80% of the growers use the Base Case with a cover crop and 20% of the growers use dormant oil with Bt at bloom.

a) Costs are from Zalom, et al., 1999; b) Estimated probability is based on CDPR Pesticide Use Report data, 1998-2001

c) Costs are from Thomas, F. CERUS Consulting. Personal Communication; d) Costs for typical practices are from University of California Cooperative Extension (UCCE 2001a,b; 1998)

"**Other Cultural Costs--Non Pest Management**" includes annual cost per acre for typical cultural practices such as winter sanitation, pruning, brush disposal, pollination, irrigation, fertilization, leaf analysis, vertebrate pest, weed, and disease control, vehicle use, and consultant fees. "**Harvest Costs**" include shaking, raking, sweeping, pickup and haul, hull and shell, bin distribution, hand picking, and field sorting, depending on the crop type. "**Advisory Board Assessment**" is a mandatory fee assessed on each ton harvested "**Interest on Operating Capital**" is based on cash operating costs and is calculated monthly until harvest at a nominal rate of 10.51% per year. "**Cash Overhead**" is expenses assigned to the whole farm, including property taxes, interest on operating capital, office expense, insurance, sanitation services, and equipment repairs. "**Annualized Planting Costs**" includes land preparation, tree cost, planting, and staking, divided by orchard lifespan (almonds and peaches 25 years; plums 30 years)

Appendix F
Detailed Cost Analysis for Pest Management and Runoff Mitigation Alternatives

Table F.3. Cost analysis for base case and alternate scenarios for prunes. Costs are per acre. Vegetated cover is provided by a planted cover crop.

	Base case: dormant oil + diazinon	Low risk to water quality[1]			Mix: high & low risk to water quality	High risk to water quality
Cost Category		Dormant oil only	Dormant oil[2] + Bt at bloom	Dormant oil + spinosad	SEE FOOT-NOTE 5	
Pest Management [a]						
Cost per Application (based on 100 acres)	$20	$20	$20	$20		$20
Dormant Pesticides						
Supreme Oil (4 gal/acre)	$12	$12	$12	$12		$12
Success (6 oz/ac)				$30		
Diazinon 50 (3.5 lb/acre)	$19					
Asana XL (4-6 oz/ac)[3]						$5
Dipel (1 lb/ac) [2]			$28			
In-season Pesticides						
Trilogy 90EC (2g/acre) [2]		$140	$140	$140		
Omite 30 WP (7.5 lb/acre)						$45
Probability of Needing In-season Applications[b]	0.05	0.01	0.4	0.4		0.05
Cover Crop[c]		$50	$50	$50	$50	$50
Other Cultural Costs	$851	$851	$851	$851	$851	$851
Total Cultural Costs	$904	$935	$1,073	$1,035	$1,002	$941
Other Costs[d]						
Harvest Costs per acre	$1,229	$1,229	$1,229	$1,229	$1,229	$1,229
Advisory Board Assessment	$120	$120	$120	$120	$120	$120
Interest on Operating Capital	$63	$64	$68	$67	$66	$64
Cash Overhead	$214	$214	$214	$214	$214	$214
Annualized Planting Costs	$39	$39	$39	$39	$39	$39
Total Costs	$2,569	$2,601	$2,743	$2,704	$2,670	$2,608
Gross Revenue[4]	$3,200	$3,200	$3,200	$3,200	$3,200	$3,200
Returns to Land, Mgt & Overhead	$631	$599	$457	$496	$530	$592
Total Costs as Percent of Gross Revenue	80%	81%	86%	85%	83%	81%
Change in Cost from Base Case	$-	$32	$174	$135	$100	$38
% Change in Cost from Base Case	0%	1%	7%	5%	4%	1%

1) Feasibility of this option may depend on pest pressure; 2) Two applications required--cost is for two applications; 3) Choice of this pesticide will also probably require use of miticide such as Vendex, Apollo, Omite, Kelthane, Agri-Mek; 4) Yield for almonds: 1 ton per acre Price per ton: $2000 Data are for 2001; Yield for peaches: 22 tons per acre Price per ton: $210 Data are for 1998, a cost inflation rate of 3% was used to adjust costs to 2001: Yield for dried plums: 4 tons per acre Price per ton: $800 Data are for 2001. 5) The costs for the "Mix" of low risk and high risk scenarios assumes 60% of the growers use the Base Case with a cover crop and 40% of the growers use dormant oil with Bt at bloom.

a) Costs are from Zalom, et al., 1999; b) Estimated probability is based on CDPR Pesticide Use Report data, 1998-2001

c) Costs are from Thomas, F. CERUS Consulting. Personal Communication; d) Costs for typical practices are from University of California Cooperative Extension (UCCE 2001a,b; 1998)

"**Other Cultural Costs--Non Pest Management**" includes annual cost per acre for typical cultural practices such as winter sanitation, pruning, brush disposal, pollination, irrigation, fertilization, leaf analysis, vertebrate pest, weed, and disease control, vehicle use, and consultant fees. "**Harvest Costs**" include shaking, raking, sweeping, pickup and haul, hull and shell, bin distribution, hand picking, and field sorting, depending on the crop type. "**Advisory Board Assessment**" is a mandatory fee assessed on each ton harvested "**Interest on Operating Capital**" is based on cash operating costs and is calculated monthly until harvest at a nominal rate of 10.51% per year. "**Cash Overhead**" is expenses assigned to the whole farm, including property taxes, interest on operating capital, office expense, insurance, sanitation services, and equipment repairs. "**Annualized Planting Costs**" includes land preparation, tree cost, planting, and staking, divided by orchard lifespan (almonds and peaches 25 years; plums 30 years)

Appendix F
Detailed Cost Analysis for Pest Management and Runoff Mitigation Alternatives

Table F.4. Detailed cost analysis for base case and alternate scenarios for almonds. Costs are per acre. Vegetated cover is provided by resident vegetation.

	Base case: dormant oil + diazinon	Low risk to water quality[1]			Mix: high & low risk to water quality	High risk to water quality
Cost Category		Dormant oil only	Dormant oil[2] + Bt at bloom	Dormant oil + spinosad	SEE FOOT-NOTE 5	
Pest Management[a]						
Cost per Application (based on 100 acres)	$20	$20	$20	$20		$20
Dormant Pesticides						
Supreme Oil (4 gal/acre)	$12	$12	$12	$12		$12
Success (6 oz/ac)				$30		
Diazinon 50 (3.5 lb/acre)	$19					
Asana XL (4-6 oz/ac)[3]						$5
Dipel (1 lb/ac)[2]			$28			
In-season Pesticides						
Trilogy 90EC (2g/acre)[2]		$140	$140	$140		
Omite 30 WP (7.5 lb/acre)						$45
Probability of Needing In-season Applications[b]	0.35	0.20	0.20	0.40		0.35
Cover Crop[c]		$-	$-	$-	$-	$-
Other Cultural Costs	$928	$928	$928	$928	$928	$928
Total Cultural Costs	$993	$996	$1,064	$1,062	$1,050	$988
Other Costs[d]						
Harvest Costs per acre	$330	$330	$330	$330	$330	$330
Advisory Board Assessment	$-	$-	$-	$-	$-	$-
Interest on Operating Capital	$37	$37	$39	$39	$39	$37
Cash Overhead	$134	$134	$134	$134	$134	$134
Annualized Planting Costs	$43	$43	$43	$43	$43	$43
Total Costs	$1,537	$1,540	$1,610	$1,608	$1,596	$1,532
Gross Revenue[4]	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000
Returns to Land, Mgt & Overhead	$463	$460	$390	$392	$404	$468
Total Costs as Percent of Gross Revenue	77%	77%	81%	80%	80%	77%
Change in Cost from Base Case	$-	$3	$73	$71	$59	$(5)
% Change in Cost from Base Case	0%	0%	5%	5%	4%	0%

1) Feasibility of this option may depend on pest pressure; 2) Two applications required--cost is for two applications; 3) Choice of this pesticide will also probably require use of miticide such as Vendex, Apollo, Omite, Kelthane, Agri-Mek; 4) Yield for almonds: 1 ton per acre Price per ton: $2000 Data are for 2001; Yield for peaches: 22 tons per acre Price per ton: $210 Data are for 1998, a cost inflation rate of 3% was used to adjust costs to 2001: Yield for dried plums: 4 tons per acre Price per ton: $800 Data are for 2001. 5) The costs for the "Mix" of low risk and high risk scenarios assumes 20% of the growers use the Base Case with a cover crop and 80% of the growers use dormant oil with Bt at bloom.

a) Costs are from Zalom, et al., 1999; b) Estimated probability is based on CDPR Pesticide Use Report data, 1998-2001

c) Assumes natural vegetation is allowed to grow between tree rows during dormant season; d) Costs for typical practices are from University of California Cooperative Extension (UCCE 2001a,b; 1998)

"**Other Cultural Costs--Non Pest Management**" includes annual cost per acre for typical cultural practices such as winter sanitation, pruning, brush disposal, pollination, irrigation, fertilization, leaf analysis, vertebrate pest, weed, and disease control, vehicle use, and consultant fees. "**Harvest Costs**" include shaking, raking, sweeping, pickup and haul, hull and shell, bin distribution, hand picking, and field sorting, depending on the crop type. "**Advisory Board Assessment**" is a mandatory fee assessed on each ton harvested "**Interest on Operating Capital**" is based on cash operating costs and is calculated monthly until harvest at a nominal rate of 10.51% per year. "**Cash Overhead**" is expenses assigned to the whole farm, including property taxes, interest on operating capital, office expense, insurance, sanitation services, and equipment repairs. "**Annualized Planting Costs**" includes land preparation, tree cost, planting, and staking, divided by orchard lifespan (almonds and peaches 25 years; plums 30 years)

Appendix F
Detailed Cost Analysis for Pest Management and Runoff Mitigation Alternatives

Table F.5. Cost analysis for base case and alternate scenarios for peaches. Costs are per acre. Vegetated cover is provided by resident vegetation.

	Base case: dormant oil + diazinon	Low risk to water quality[1]			Mix: high & low risk to water quality	High risk to water quality
Cost Category		Dormant oil only	Dormant oil[2] + Bt at bloom	Dormant oil + spinosad	SEE FOOT-NOTE 5	
Pest Management [a]						
Cost per Application (based on 100 acres)	$20	$20	$20	$20		$20
Dormant Pesticides						
Supreme Oil (4 gal/acre)	$12	$12	$12	$12		$12
Success (6 oz/ac)				$30		
Diazinon 50 (3.5 lb/acre)	$19					
Asana XL (4-6 oz/ac)[3]						$5
Dipel (1 lb/ac) [2]			$28			
In-season Pesticides						
Trilogy 90EC (2g/acre) [2]		$140	$140	$140		
Omite 30 WP (7.5 lb/acre)						$45
Probability of Needing In-season Applications[b]	0.1	0.1	0.2	0.7		0.25
Cover Crop[c]		$-	$-	$-	$-	$-
Other Cultural Costs	$1,415	$1,415	$1,415	$1,415	$1,415	$1,415
Total Cultural Costs	$1,470	$1,465	$1,551	$1,603	$1,486	$1,468
Other Costs[d]						
Harvest Costs per acre	$975	$975	$975	$975	$975	$975
Advisory Board Assessment	$42	$43	$43	$43	$43	$43
Interest on Operating Capital	$70	$70	$72	$74	$70	$70
Cash Overhead	$248	$248	$248	$248	$248	$248
Annualized Planting Costs	$75	$75	$75	$75	$75	$75
Total Costs	$2,880	$2,876	$2,964	$3,018	$2,898	$2,879
Gross Revenue[4]	$4,620	$4,620	$4,620	$4,620	$4,620	$4,620
Returns to Land, Mgt & Overhead	$1,740	$1,744	$1,656	$1,602	$1,722	$1,741
Total Costs as Percent of Gross Revenue	62%	62%	64%	65%	63%	62%
Change in Cost from Base Case	$-	$(4)	$84	$138	$18	$(1)
% Change in Cost from Base Case	0%	0%	2%	3%	0%	0%

1) Feasibility of this option may depend on pest pressure; 2) Two applications required--cost is for two applications; 3) Choice of this pesticide will also probably require use of miticide such as Vendex, Apollo, Omite, Kelthane, Agri-Mek; 4) Yield for almonds: 1 ton per acre Price per ton: $2000 Data are for 2001; Yield for peaches: 22 tons per acre Price per ton: $210 Data are for 1998, a cost inflation rate of 3% was used to adjust costs to 2001: Yield for dried plums: 4 tons per acre Price per ton: $800 Data are for 2001.
5) The costs for the "Mix" of low risk and high risk scenarios assumes 80% of the growers use the Base Case with a cover crop and 20% of the growers use dormant oil with Bt at bloom.

a) Costs are from Zalom, et al., 1999; b) Estimated probability is based on CDPR Pesticide Use Report data, 1998-2001

c) Assumes natural vegetation is allowed to grow between tree rows during dormant season; d) Costs for typical practices are from University of California Cooperative Extension (UCCE 2001a,b; 1998)

"**Other Cultural Costs--Non Pest Management**" includes annual cost per acre for typical cultural practices such as winter sanitation, pruning, brush disposal, pollination, irrigation, fertilization, leaf analysis, vertebrate pest, weed, and disease control, vehicle use, and consultant fees. "**Harvest Costs**" include shaking, raking, sweeping, pickup and haul, hull and shell, bin distribution, hand picking, and field sorting, depending on the crop type. "**Advisory Board Assessment**" is a mandatory fee assessed on each ton harvested "**Interest on Operating Capital**" is based on cash operating costs and is calculated monthly until harvest at a nominal rate of 10.51% per year. "**Cash Overhead**" is expenses assigned to the whole farm, including property taxes, interest on operating capital, office expense, insurance, sanitation services, and equipment repairs. "**Annualized Planting Costs**" includes land preparation, tree cost, planting, and staking, divided by orchard lifespan (almonds and peaches 25 years; plums 30 years)

Appendix F
Detailed Cost Analysis for Pest Management and Runoff Mitigation Alternatives

Table F.6. Cost analysis for base case and alternate scenarios for prunes. Costs are per acre. Vegetated cover is provided by resident vegetation.

	Base case: dormant oil + diazinon	Low risk to water quality[1]			Mix: high & low risk to water quality	High risk to water quality
Cost Category		Dormant oil only	Dormant oil[2] + Bt at bloom	Dormant oil + spinosad	SEE FOOT-NOTE 5	
Pest Management [a]						
Cost per Application (based on 100 acres)	$20	$20	$20	$20		$20
Dormant Pesticides						
Supreme Oil (4 gal/acre)	$12	$12	$12	$12		$12
Success (6 oz/ac)				$30		
Diazinon 50 (3.5 lb/acre)	$19					
Asana XL (4-6 oz/ac)[3]						$5
Dipel (1 lb/ac) [2]			$28			
In-season Pesticides						
Trilogy 90EC (2g/acre) [2]		$140	$140	$140		
Omite 30 WP (7.5 lb/acre)						$45
Probability of Needing In-season Applications[b]	0.05	0.01	0.4	0.4		0.05
Cover Crop[c]		$-	$-	$-	$-	$-
Other Cultural Costs	$851	$851	$851	$851	$851	$851
Total Cultural Costs	$904	$885	$1,023	$985	$952	$891
Other Costs[d]						
Harvest Costs per acre	$1,229	$1,229	$1,229	$1,229	$1,229	$1,229
Advisory Board Assessment	$120	$120	$120	$120	$120	$120
Interest on Operating Capital	$63	$63	$67	$66	$65	$63
Cash Overhead	$214	$214	$214	$214	$214	$214
Annualized Planting Costs	$39	$39	$39	$39	$39	$39
Total Costs	$2,569	$2,550	$2,692	$2,653	$2,618	$2,556
Gross Revenue[4]	$3,200	$3,200	$3,200	$3,200	$3,200	$3,200
Returns to Land, Mgt & Overhead	$631	$650	$508	$547	$582	$644
Total Costs as Percent of Gross Revenue	80%	80%	84%	83%	82%	80%
Change in Cost from Base Case	$-	$(20)	$122	$83	$49	$(13)
% Change in Cost from Base Case	0%	-1%	5%	3%	2%	-1%

1) Feasibility of this option may depend on pest pressure; 2) Two applications required--cost is for two applications; 3) Choice of this pesticide will also probably require use of miticide such as Vendex, Apollo, Omite, Kelthane, Agri-Mek; 4) Yield for almonds: 1 ton per acre Price per ton: $2000 Data are for 2001; Yield for peaches: 22 tons per acre Price per ton: $210 Data are for 1998, a cost inflation rate of 3% was used to adjust costs to 2001: Yield for dried plums: 4 tons per acre Price per ton: $800 Data are for 2001.
5) The costs for the "Mix" of low risk and high risk scenarios assumes 60% of the growers use the Base Case with a cover crop and 40% of the growers use dormant oil with Bt at bloom.

a) Costs are from Zalom, et al., 1999; b) Estimated probability is based on CDPR Pesticide Use Report data, 1998-2001

c) Assumes natural vegetation is allowed to grow between tree rows during dormant season; d) Costs for typical practices are from University of California Cooperative Extension (UCCE 2001a,b; 1998)

"**Other Cultural Costs--Non Pest Management**" includes annual cost per acre for typical cultural practices such as winter sanitation, pruning, brush disposal, pollination, irrigation, fertilization, leaf analysis, vertebrate pest, weed, and disease control, vehicle use, and consultant fees. "**Harvest Costs**" include shaking, raking, sweeping, pickup and haul, hull and shell, bin distribution, hand picking, and field sorting, depending on the crop type. "**Advisory Board Assessment**" is a mandatory fee assessed on each ton harvested "**Interest on Operating Capital**" is based on cash operating costs and is calculated monthly until harvest at a nominal rate of 10.51% per year. "**Cash Overhead**" is expenses assigned to the whole farm, including property taxes, interest on operating capital, office expense, insurance, sanitation services, and equipment repairs. "**Annualized Planting Costs**" includes land preparation, tree cost, planting, and staking, divided by orchard lifespan (almonds and peaches 25 years; plums 30 years)

Appendix F
Detailed Cost Analysis for Pest Management and Runoff Mitigation Alternatives
Description of How Probability for Determining In-Season Sprays was Determined

With the exception of the dormant oil and Spinosad scenario, the probability for needing an in-season spray was determined based on pesticide use data. Since there were relatively few Spinosad treatments on almonds, peaches, and orchards, the probability of needing an in-season treatment was based on a review of information provided in Zalom (1999). The description of the queries performed to develop the probabilities is given below.

Overview

The following provides a description of data processing procedures used on California Department of Pesticide Regulation (CDPR) Pesticide Use Report (PUR) data. These procedures allowed Regional Board staff to determine the number of growers who applied specific chemicals (and the number of acres to which the specific chemicals were applied) to almond, peach, plum, or prune crops during the dormant seasons of 1998-1999 though 2000-2001 and who also applied specific chemicals to the same crops during the subsequent in-season period for each year. The data queries (using Access 2000) and other data processing steps (e.g., summing of values using Excel 2000) that were employed are described below.

Initial PUR Data Filter

Data queries were applied to the PUR annual database tables for 1998 through 2001 under specific parameters (described below) to create a series of tables each containing the records for specific chemical applications to specific (orchard) crops, for specific periods (dormant season and in-season) within the Sacramento Valley.

A table containing all of the unique CMTRS values within the Sacramento Valley (which represents all of the geographical sections comprising the Sacramento Valley), and a table listing the specific chemicals of interest: dormant oil only; diazinon; esfenvalerate and permethrin; Bacillus thuringiensis (Bt); and spinosad were sequentially joined to the PUR annual database tables for 1998 through 2001. The list of CMTRS for the Sacramento Valley was derived using ArcView GIS and refined (to eliminate duplicate values). The Sacramento Valley was defined in the GIS as the area comprising the Calwater 2.2 hydrologic units lying within the valley floor between approximately Redding and Sacramento.

The first set of queries were also limited to: 1) the dormant season (defined as December of a given year and January through March of the following year) and in-season months (April through September; separate tables were created for each period) of application; and, 2) the crops ('almond' or 'peach' or 'plum*' or 'prune' in the SITE_NAME field of the PUR database).

The tables of records for applications (for each chemical group and crop) reported as being made in January through March of a given year were appended to the tables of records for applications in December of the previous year for the same chemical group and crop to create tables representing chemical applications for each dormant season.

The structure of each table was copied into new a new file in which the CHEM_NAME [chemical name], APPLIC_DT [application date], ACRE_TREATED, CMTRS [the geographic section in which the application was reported to have occurred], GROWER_ID, SITE_LOC_ID [a growers designation for the field in which the application occurred], and SITE_NAME [crop type] fields were set as primary keys, to eliminate duplicate records (and duplicate counting).

In particular, the dormant season table for each chemical application was exported to Excel and the number of (total) acres treated during the dormant season for each chemical application was determined by summing.

Dormant Season vs In Season Chemical Applications Comparison

Dormant season tables for diazinon, Bacillus thurengiensis (Bt), pyrethroids (esfenvalerate and permethrin), spinosad, and dormant oils only were sequentially joined to associated (same year) in-season tables in a series of Access queries for each of the following chemical applications: diazinon; chlorpyrifos; methidathion; phosmet; azinphos methyl; malathion; parathion; esfenvalerate; permethrin; carbaryl; Bt; and spinosad. These queries were created by joining the dormant and in-season tables for a given year on the SITE_NAME, ACRE_TREATED, GROWER_ID and SITE_LOC_ID fields. Since Bt is typically applied at least two times during a season, the Bt in-season application tables for each year were first copied into new files in which the CHEM_NAME, ACRE_TREATED, CMTRS, GROWER_ID, SITE_LOC_ID, and SITE_NAME fields were set as primary keys, to eliminate duplicate records (and duplicate counting).

Thus, it was assumed that if all four parameters (SITE_NAME, ACRE_TREATED, GROWER_ID and SITE_LOC_ID) matched exactly between the dormant season and in-season tables, the in-season chemical applications were made to the same orchard block as the matching dormant season applications. The resulting tables were exported to Excel and the number of acres treated by any of the list of in-season chemicals (specified above) were summed for each dormant season chemical.

The total number of acres that received an in-season application following a dormant season application was divided by the number of acres that received a particular dormant season application. This yielded the probability (fraction) of acres that were first treated with each specific dormant season chemical (during the dormant season) and were later treated (during the in-season period) with a second chemical application.

For example, in the 1999-2000 dormant season 38 growers reported treating 2,798 acres of almonds in the Sacramento Valley with diazinon. Reported “in-season” applications by those growers applying diazinon are shown in Table F.7.

Table F.7. In-season applications of insecticides by almond growers in the Sacramento Valley who applied diazinon during the dormant season. 1999-2000.

2nd chemical application	Number of growers	Number of acres treated
diazinon	0	0
chlorpyrifos	8	532
methidathion	0	0
phosmet	1	22
azinphos methyl	1	487
malathion	0	0
parathion	0	0
esfenvalerate	3	188
permethrin	0	0
carbaryl	1	2
B. thuringiensis	0	0
Spinosad	0	0
Total	14	1,231

Based on this information, about 44% of the acres treated with diazinon during the dormant season required a follow-up in-season treatment for insect control in 2000. As discussed above, similar tables were created for the 1998-1999 and 2000-2001 dormant seasons. For this example, the total number of almond acres treated with diazinon during the three dormant seasons (1998-99 through 2000-01) that required an in-season treatment was divided by the total number of almond acres treated with diazinon. This number was rounded to the nearest 5% to give the estimated probability of a dormant application of diazinon requiring an in-season treatment for almonds.